

AR212069

ART700FH, 30-520 MHz

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AMPLEON

Application Report

Document information

Info	Content
Status	General Publication
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Abstract	Measurement results of ART700FH LDMOS device in board #AR212069 tested over 30-520MHz at 50V

1 Revision History

Table 1. Report revisions

Revision No.	Date	Description	Author
1.0	20210622	Initial document	Bill Goumas

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5 General Description

This report presents the measurement results of the Class AB Demo board AR212069. The device used is an ART700FH which is a 700W LDMOS device from Ampleon's Advanced Rugged Technology(ART) family.

8 Summary

This demo is based on version with the BLF184. Initial measurements show that the power is on par with the BLF184 over 30-520MHz. Sections 9.3-9.5 show comparisons to the BLF184 board.

Next step is improve the input match and add the thermal compound. Bigger diameter coax will also be looked at. The goal is for 500W CW over the entire range. The high end roll-off between 500 and 520MHz will also need to be addressed. A simple LC network on the output of the transformer should fix this issue.

Table 2. RF Performance Vdd=50V, Idq=600mA

Symbol	Parameter	Range	Unit
Freq.	Frequency Range	30-500	MHz
P3dB	Power at 3dB Gain Compression	>500	W
Eff.@500W	Efficiency	>40	%
G _{min.} @500W	Minimum Gain	15.0	dB

9 Performance Details

9.1 Small Signal Results

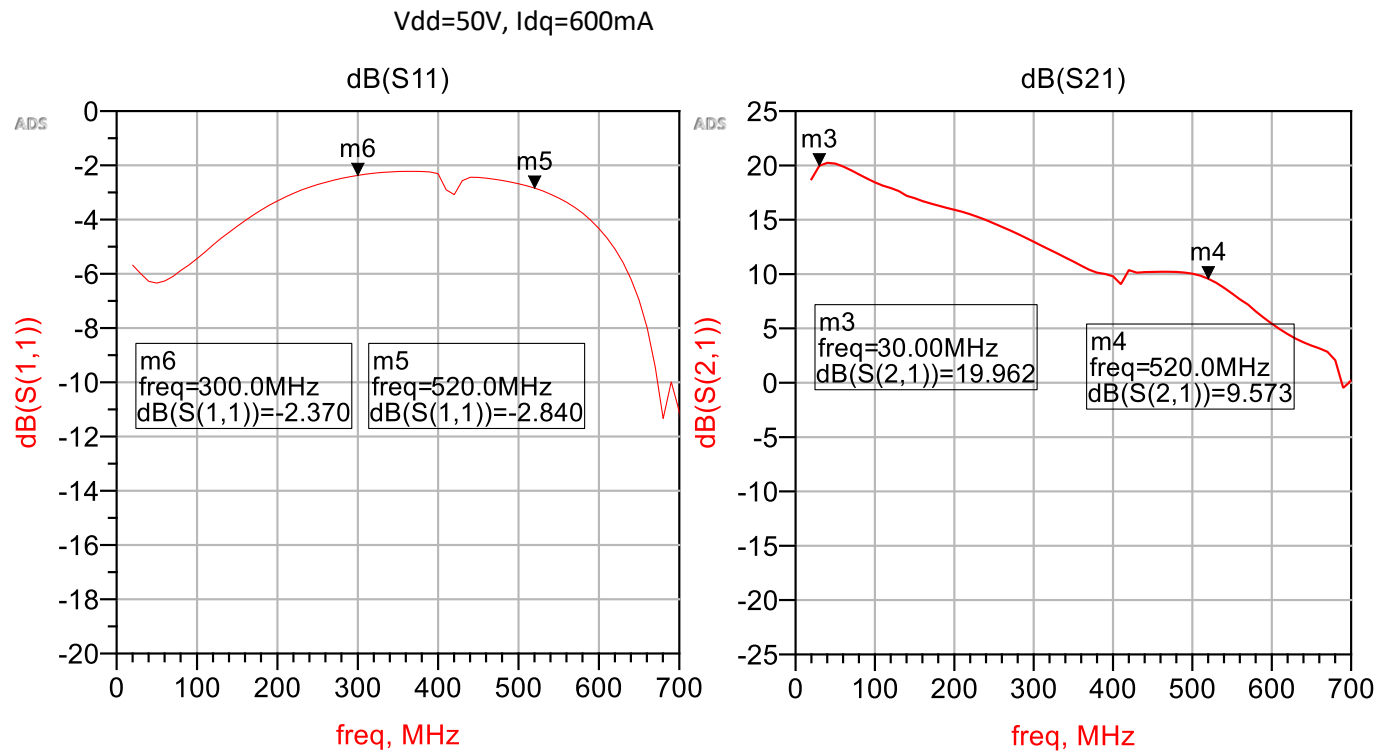


Figure 2. Small Signal Data, V_{dd}=50V, I_{dq}=600mA, Pin=10dBm

9.2 Pulse Gain, Efficiency vs Pout and Frequency,

Vdd=50V, Idq=600mA, 10% Duty Cycle, PW=100usec Low Frequencies

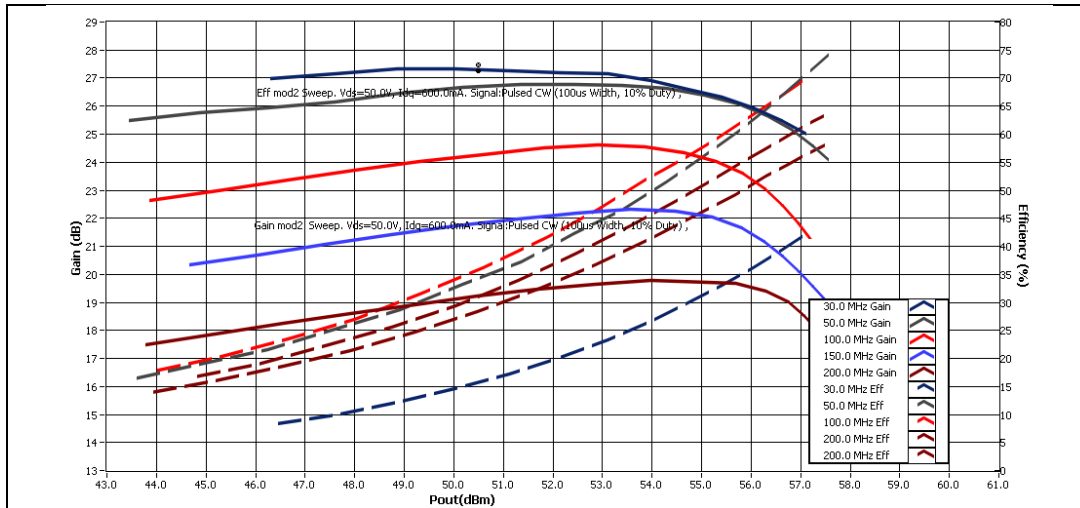


Figure 3. Pulse Gain(dB),Eff(%) vs Power Out(W),10% duty

Vdd=50V, Idq=600mA, 10% Duty Cycle High Frequencies

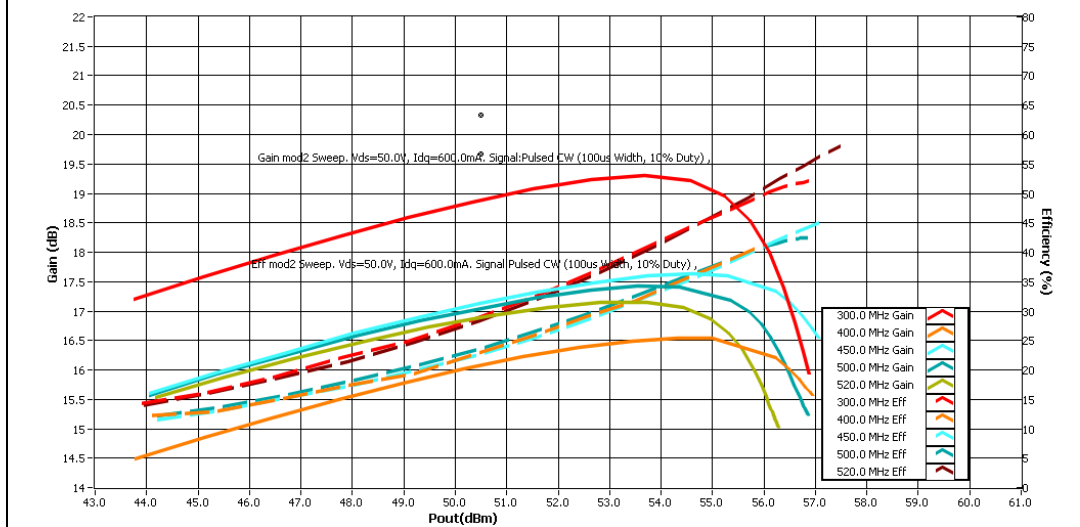


Figure 4. Gain(dB),Eff(%) vs Power Out(dBm),10% duty

9.3 Pulse Gain, Efficiency vs Power out Comparison to BLF184

ART700FH, Vdd=50V, Idq=600mA 10% Duty, High Frequency Range

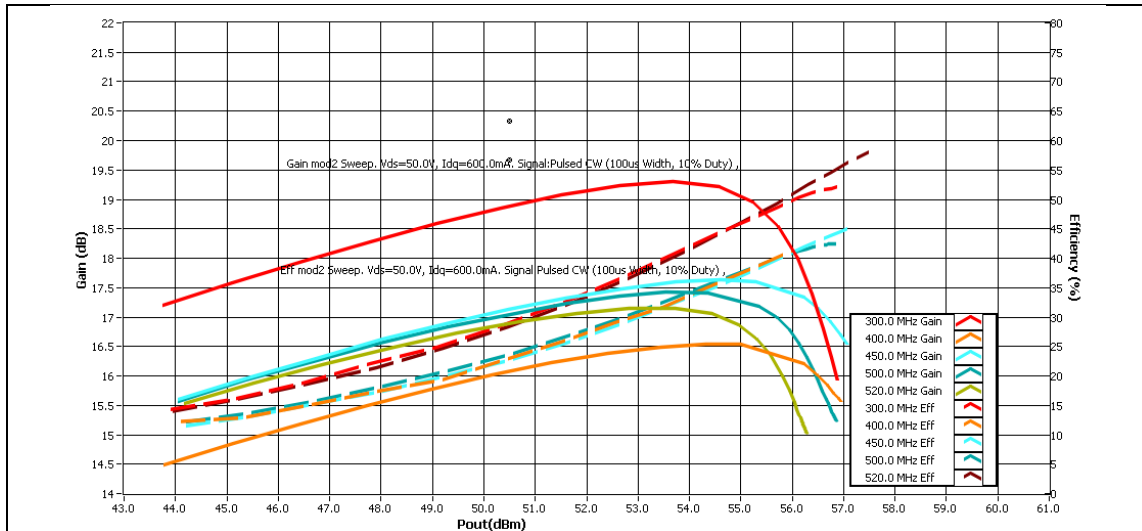


Figure 5. Gain(dB),Eff(%) vs Power Out(dBm),10% duty

BLF184 in Board AR192029 High Frequency Range

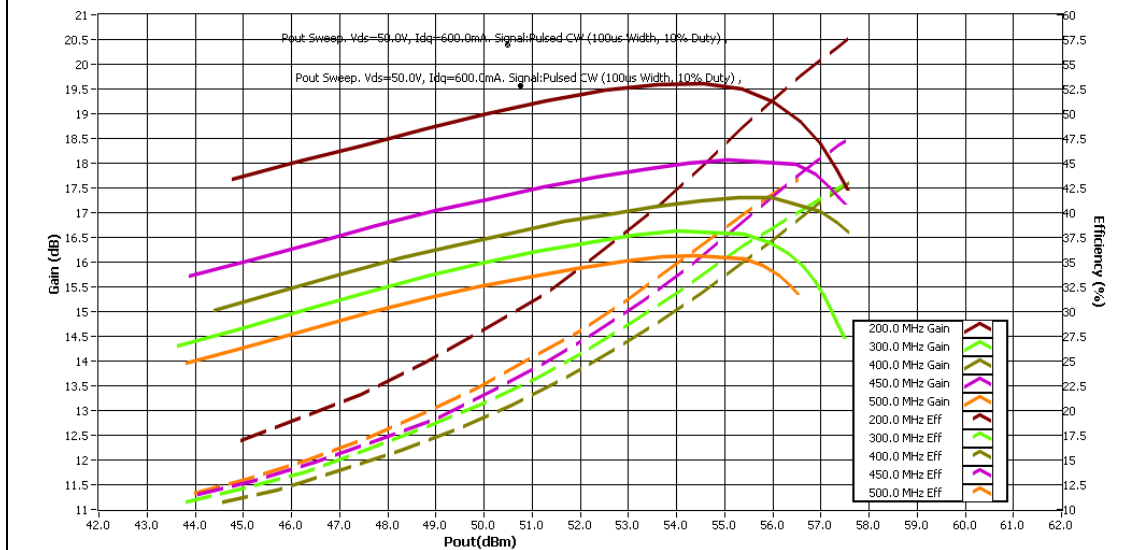


Figure 6. Gain(dB),Eff(%) vs Power Out(dBm),10% duty

9.4 Performance at Fixed Power Output

ART700FH in Board 212069, Vdd=50V

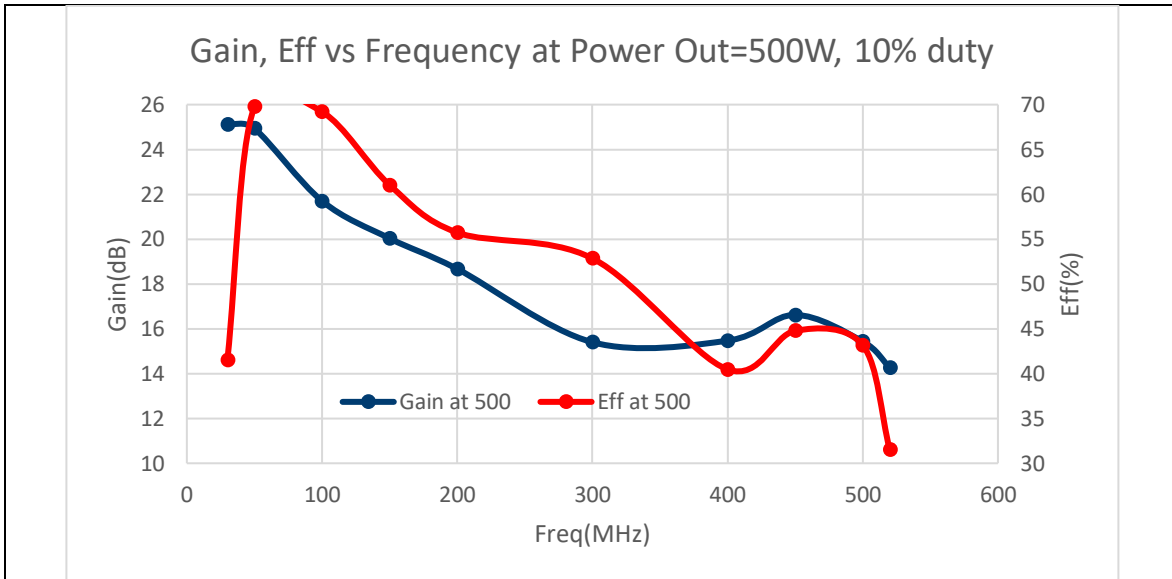


Figure 7. Gain(dB),Eff(%) vs Freq(MHz)

BLF184 in Board 1920209, Vdd=50, Idq=600mA,

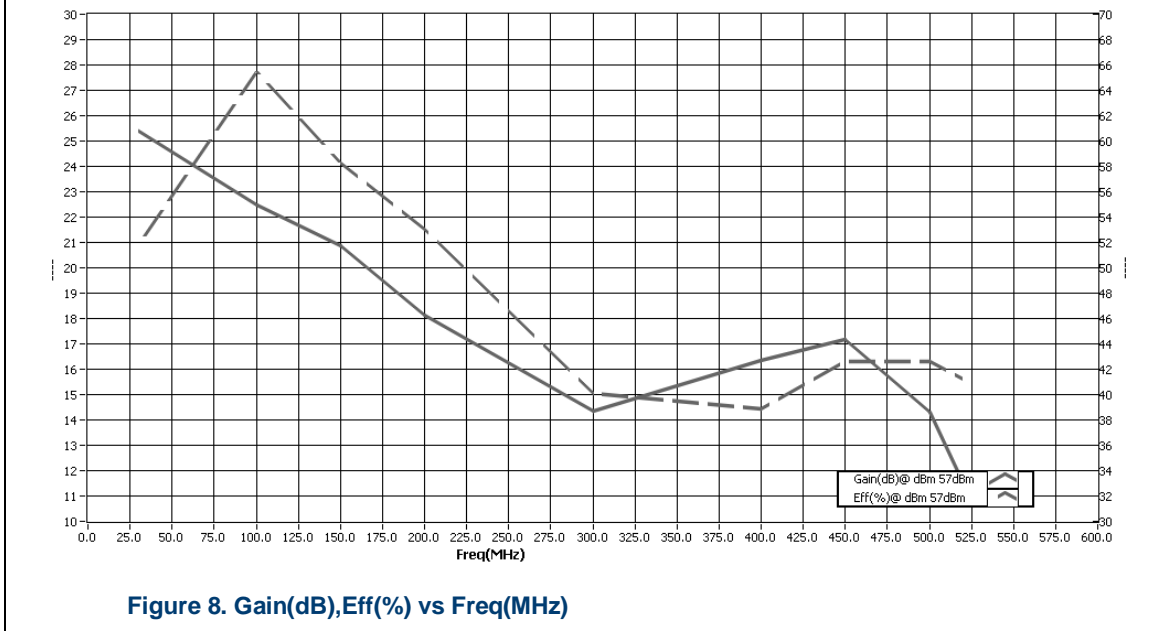


Figure 8. Gain(dB),Eff(%) vs Freq(MHz)

9.5 P1 and P2dB vs Frequency

ART700FH in Bd 212069, Vdd=50V, Idq=600mA, 10% Duty

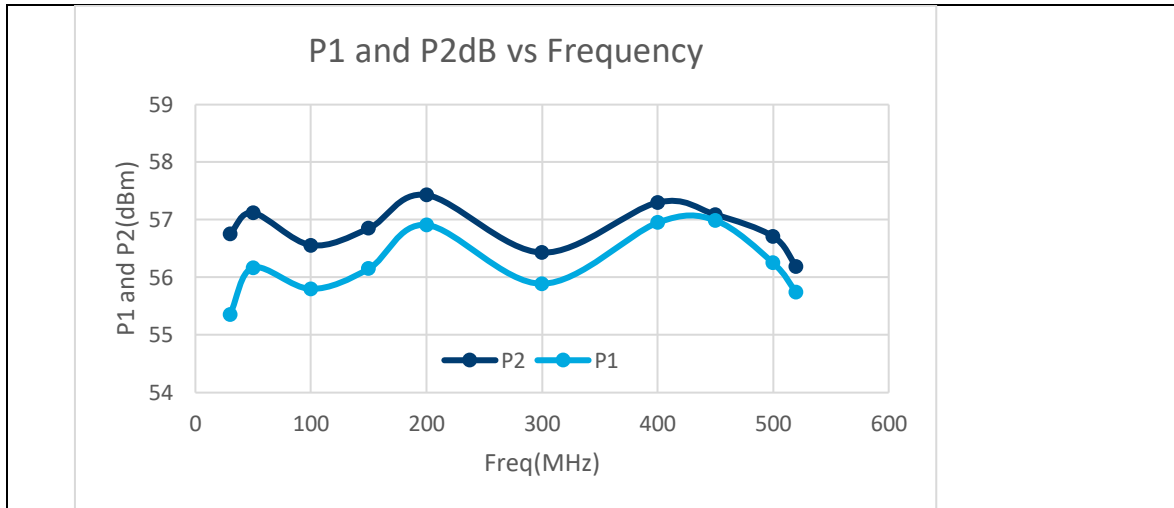


Figure 9. Gain(dB),Eff(%) vs Freq(MHz)

BLF184 in Bd 192029, Vdd=50, Idq=500mA,

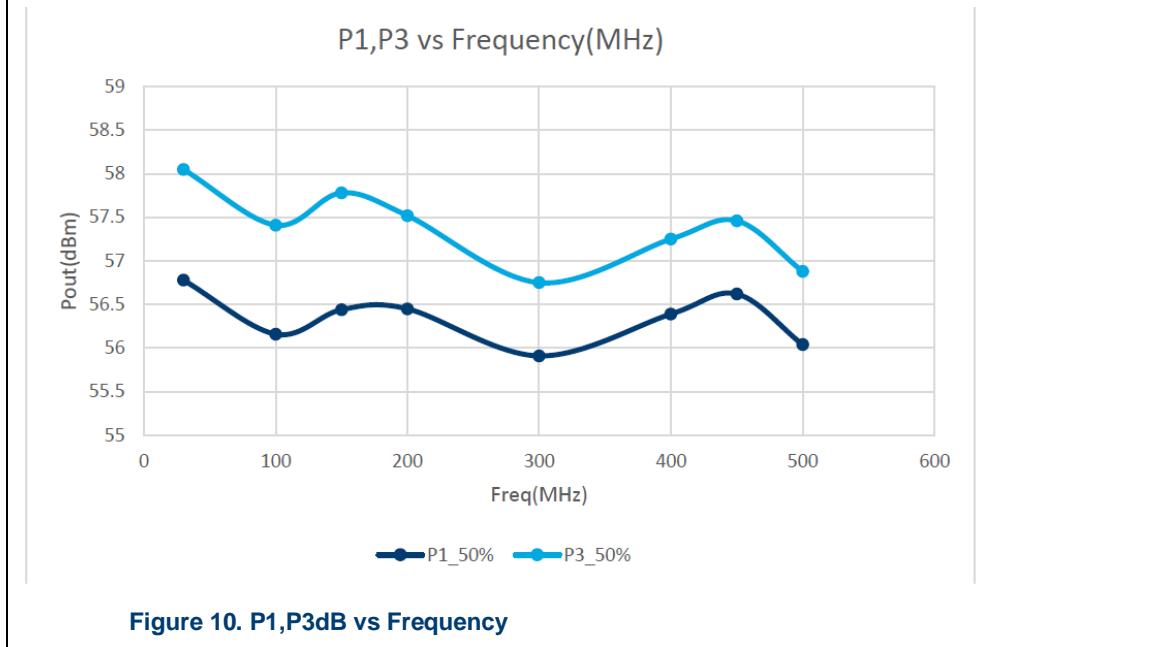


Figure 10. P1,P3dB vs Frequency

10 Hardware

10.1 Board photographs

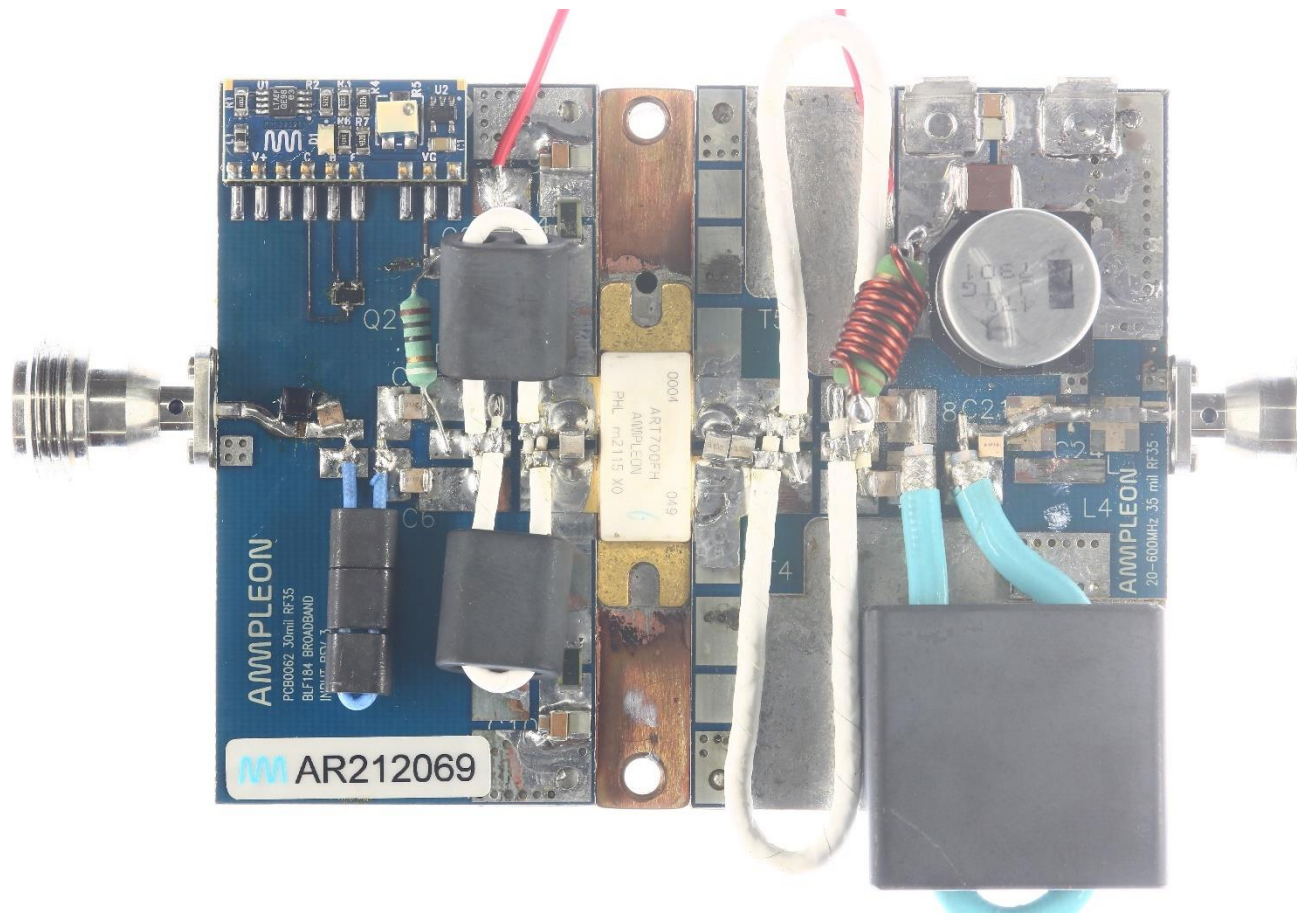


Figure 11. Board Photograph

10.2 PCB layout

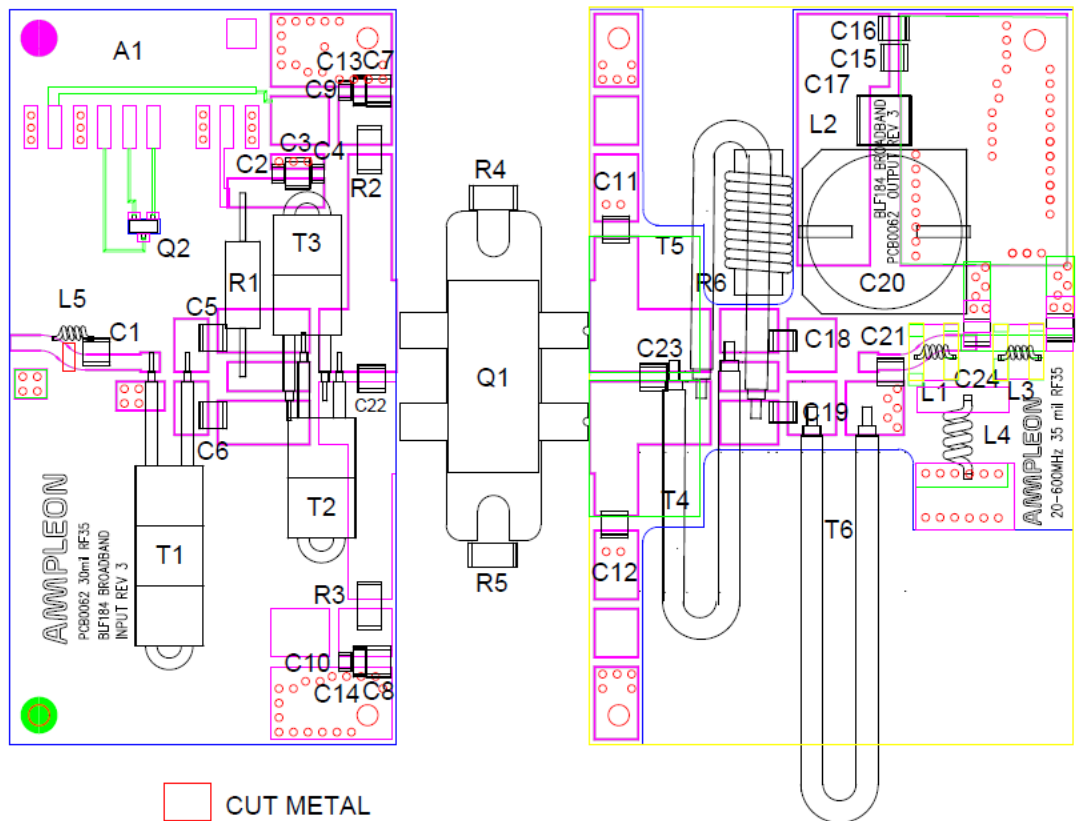


Figure 12.PCB Layout

10.3 Bill of materials

Table 3. BOM

Designator	Description	Manufacturer	Part#
PCB Input PCB	Input PCB, 30mil thk. RF35	Avanti Circuits	PCB00062 Input Rev3
PCB Output PCB	Output PCB, 30 mil thk. RF35	Avanti Circuits	PCB00062 Output Rev3
A1	LDMOS bias module	Ampleon	CA-330-11
Q1	RF Transistor	Ampleon	ART700FH
Q2	2N2222 NPN Transistor	Fairchild	MMBT2222
R1	10Ω 0.5W5%	Generic	
R2, R3	20 Ω 5%	IMS	NADC-2010WA20R0J
R4,R5	DNP	ATC	FR10300N0200J
R6	10 Ω 3W	Generic	
L1	17.5nH	Coilcraft	B01
L2	8 turn 18AWG wrapped onto R6	Internal	
L3	DNP		
L4	DNP		
C1,C32	1000pF	Passive Plus or ATC	1111N or 100B
C2, C4, C9, C10	100nF, 50V 10% X7R, 0805	Generic	
C3, C7, C8,C15	4.7nF,100V 5% NPO, 1210	Generic	
C13,C14	10uF,100V 10% X7R, 1206	Generic	
C11,C12	DNP	Generic	
C16	100nF,100V 10% X7R, 1210	Generic	
C17	10uF, 100V 10% X7S, 2220	TDK	C5750X7S2A106M
C5,C6,C18, 19	910pF, 500V 5%	Passive Plus or ATC	1111N or 100B
C20	470uF, 63V, alum electrolytic	Generic	
C21	2.2pF	Passive Plus or ATC	1111N or 100B
C22	27 and 22pF	Passive Plus or ATC	1111N or 100B
C23	2 x 10pF	Passive Plus or ATC	1111N or 100B
C24	DNP	Passive Plus or ATC	
C31	1000pF	Passive Plus or ATC	600F
T1	1:1 Input Balun	Micro Coax Fair-Rite	55mm PE-P047 50 flexible ohm coax + (3) Fair-Rite 2861002402 cores
T2, T3	4:1 input transformer	Micro Coax Fair-Rite	50mm UT-047-25 25 ohm coax + (1) Fair-Rite 2861002402 core
T4, T5	4:1 output transformer	Micro Coax	3.5" UT-0C-18 18 ohm coax
T6	1:1 output balun w 1 core	Micro Coax Fair-Rite	4.1" UT-141 50 ohm coax with one BN-61-002 core

10.4 PCB materials

Table 4. Board Specifications

Parameter	Value
Manufacturer	Taconic
Type	RF35
Thickness	30 mils, 1oz. copper
Layers	2, top/bottom. Bottom all copper

10.5 Device markings

Table 5. Device Specifications

Parameter	Value
Manufacturer	Ampleon
Device	ART700FH
Date Code	M2120

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